2006 BRFSS Depression Screen (PHQ-8): What we are learning about Depression in Massachusetts

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Introduction

The Behavioral Risk Factor Surveillance Survey (BRFSS) is an on-going random-digit-dial telephone survey jointly conducted by the Centers for Disease Control and Prevention (CDC) and state health departments. It is an a unique population health surveillance tool designed to collect data on behavioral risk factors and conditions for chronic diseases, injuries, preventable infectious diseases, and health care access at the state and local level. It is administered in all 50 states, three U.S. Territories (Guam, Puerto Rico, and the Virgin Islands) and the District of Columbia.

The BRFSS collects information on seven out of the ten leading health indicators identified by Healthy People 2010.[1] Mental health was chosen as one of ten health indicators based on its "ability to motivate action, the availability of data to measure progress, and its importance as [a] public health issue."[2] Poor mental health, such as depression and anxiety, has been correlated to risky or unhealthy behaviors [3] (e.g. smoking[4 5 6], obesity[7]), the decreased use of preventive services (e.g. smoking cessation[8]), and chronic conditions (e.g. cardiovascular disease[9 10]).

The BRFSS contains a core set of "healthy days" questions developed by the CDC along with a series of optional CDC modules and state-added questions. Data derived from the questionnaire provide health departments with health status information that is unique to their populations. When combined with mortality and morbidity statistics, these data enable public health officials to establish priorities and initiate health promotion strategies.[11]

The Core Healthy Days questions are a Health-Related Quality of Life measure (HRQOL) pertaining to both physical and mental health based upon respondents' self

report. The CDC devised an algorithm to compute an overall score of HRQOL[i] as well as one for Frequent Mental Distress (FMD)[ii]. Numerous reports based upon these measures have demonstrated relationships between self-reported unhealthy days, frequent psychological distress and poor health outcomes.[12] However, the HRQOL and the FMD are not capable of detecting specific psychiatric diagnoses. "This discrimination is important for purposes of making social policy decisions regarding such things as the number of people in need of mental health services."[13]

In 2006, the CDC included the Patient Health Questionnaire (PHQ-8), an assessment of diagnosable depression based upon DSM-IV criteria, as an optional module for BRFSS. An optional module is a standard set of questions developed by CDC and/or its partners; each state determines whether to include such modules in a given year's survey, depending upon interest and funding for that particular state. Massachusetts's Department of Public Health (MA-DPH) was one of the state Health Departments that chose to include PHQ-8 in their 2006 BRFSS. The PHQ-8 BRFSS module provides state prevalence estimates of depression and enables researchers to examine relationships between depression and behavioral risk factors for illness, injury, and chronic health conditions. The Substance Abuse and Mental Health Services Administration, Center for Mental Health Services (SAMHSA, CMMHS) in partnership with the CDC, provided funding for the collaboration of the States' Departments of Public and Mental Health to analyze the PHQ-8 data, and subsequently work together in creating a public health depression intervention.

The vision of the Massachusetts Department of Mental Health (MA-DMH) is to promote recovery and resiliency through partnership so that all residents of the Commonwealth may live full and productive lives. Steps to achieve this vision include early intervention, treatment, education, policy & regulation. The Department provides PHQ-8 analysis to assist in the identification and prevention of depression especially as it relates to racial disparities, employment, health and wellness, health care access, and suicide prevention.

[i] The number of days in the past 30 days when both the physical and mental health were good and is calculated by subtracting the number of unhealthy days from 30 days.
[ii] 14 or more days in the past 30 days when mental health was not good

The Patient Health Questionnaire (PHQ-8)

The Patient Health Questionnaire (PHQ-8) consists of eight questions based upon the DSM-IV items for Major Depression. It has been modified from a self-report paper format to a format compatible to telephone interview in order to be utilized in the 2006 BRFSS. The respondent is asked about emotions or behaviors associated with depression that he or she may have experienced during the past two weeks (Box 1).The total score for the PHQ-8 ranges from 0 to 14 or the total number of days a person may have experienced a behavior and/or emotion. Validation studies on the PHQ-8 report that it is effective in detecting depression in the general population and within different races/ethnicities. It is also correct 88% of the time in detecting current depression when the severity score is greater than 10.[14]

Box 1. PHQ-8 Questions on the BRFSS

Now I am going to ask you some questions about your mood. When answering these questions, please think about how many days each of the following has occurred in the past 2 weeks.

1. Over the last two weeks, how many days have you had little interest or pleasure in doing things?
2. Over the last two weeks, how many days have you felt down, depressed or hopeless?
3. Over the last two week, how many days have you had trouble falling asleep or staying asleep or sleeping too much?
4. Over the last two weeks, how many days have you felt tired or had little energy?
5. Over the last two weeks, how many days have you had a poor appetite or ate too much?
6. Over the last two weeks, how many days have you felt bad about yourself or that you were a failure or had let yourself or your family down?
7. Over the last two weeks, how many days have you had trouble concentrating on things, such as reading the newspaper or watching tv?
8. Over the last two weeks, how many days have you moved or spoken so slowly that other people could have noticed? Or the opposite- being so fidgety or restless that you were moving around a lot more than usual?

The CDC developed three algorithms as a way to isolate varying levels of depression (Box 2).The total number of days is converted to a point scale from 0 to 3. The points are then totaled across the eight questions. Depending on the algorithm used, the total points

are then used to determine whether or not a participant was depressed at the time of interview and/or to obtain a severity of depression score.

In addition to a measure of depression there are two questions asking whether or not the respondent had ever been told by a healthcare provider that he or she had either a diagnosis of depression and/or anxiety. These questions are used as a proxy for lifetime diagnosis of either illness.

Box 2. CDC Developed Algorithms for the PHQ-8

Algorithm 1*:

Score	Depression Severity
0 to 4.9	No depression
5 to 9.9	Mild depression
10 to 15	Moderate depression
15 to 19.9	Moderately severe depression
20	Severe depression

*Scores that are greater than ten are classified as "current depression".

Algorithm 2:

Score	Depression Severity
0 to 1	No Depression • Negative response (<7 days) to Questions 1 & 2 OR • Positive response (7+ days) to <2 questions.
2 to 4	Minor Depression • Positive response (7+ days) to Questions 1 or 2 AND • Positive response (7+ days) to between 2-4 questions.
5 to 8	Major Depression • Positive response (7+ days) to Questions 1 or 2 AND • Positive response (7+ days) to a total of 5+ questions .

Algorithm 3:

Score	Depression Severity
0 to 9	Depression Severity Score Less than 10
10 or greater	Depression Severity Score Greater than 10

Methodology

This report utilizes the CDC developed Algorithm 3 (*i.e.* Depression severity score greater than 10 and depression severity score less than 10) for comparative

purposes in this report due to its validity in detecting current depression in the general population and its simplicity as a dichotomous variable. The exception to this analytical strategy is provided in *Chart 1* where Algorithm 1 is used to demonstrate the distribution of varying levels of depression severity in the Massachusetts population.

Confidence intervals are used to estimate statistical significance in the comparative analyses to determine if there are any differences between the variables investigated and the prevalence of depression. The confidence interval parameter is set at 95%. This means if repeated samples of the same size from the same population were collected and the prevalence rates for depression were recalculated, approximately 95% of the newly estimated intervals would contain the true rate (or that there is confidence that 95% of the samples include the true rate).

If the 95-percent confidence intervals do not overlap, then the difference can be said to be statistically significant at the 0.05-level, which is the maximum accepted value for significance. This is a conservative test for statistical significance and caution should be utilized when interpreting non-significance when there is only a small overlap in confidence intervals. This test will be referred to in this report as the "conservative confidence interval test".

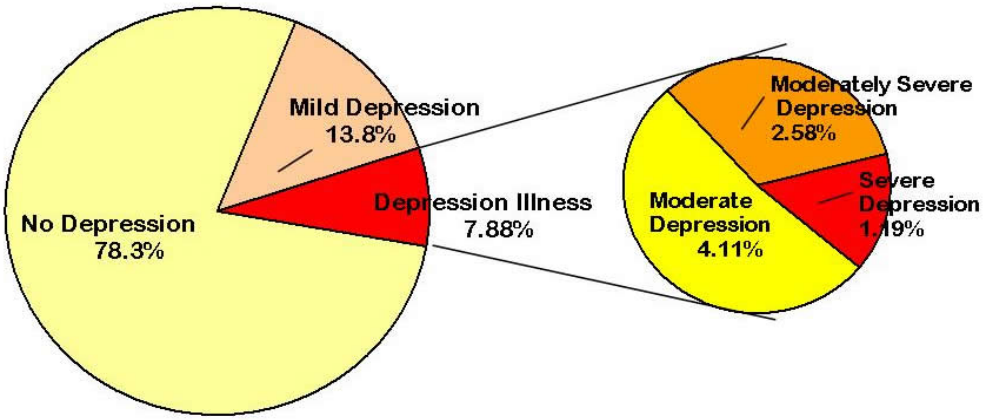
Statewide Prevalence of Depression

Depression is one of the most prevalent mental disorders[15]. The National Institute of Mental Health (NIMH) in 2000 estimated that 9.5% of the U.S. population or approximately 20.9 million Americans suffer from a depressive illness in any given year[16 17]. The National Survey on Drug Use and Health (NSDUH) estimated that, for the years 2005-2006, 7.86%[18] of Massachusetts residents had experienced a Major Depressive Episode during the past year.

The PHQ-8 was administered to 5, 992 Massachusetts residents (for participant demographics, See *Appendix A*.) as part of the 2006 Massachusetts BRFSS (MA BRFSS). In 2006 there were an estimated 4,988,309 adults age 18 years and older living in Massachusetts. Based on results from the MA BRFSS, overall 7.9% of the adult population was estimated to suffer from a major depressive illness. Among those with

depressive illness, an estimated 4.1% of adults experienced moderate depression, 2.6% moderately severe depression, and 1.2% severe depression. (*Chart 1, Algorithm 1*).

Chart 1.
Algorithm 1.
Percent Prevalence of Depression Symptoms by Severity



	Score	Percent Population Estimate	Confidence Intervals	2006 Massachusetts Population Estimate Range, Ages 18+[iii]
No Depression	0-4	78.3	76.0 - 80.2	3,791,114-3,990,647
Mild Depression	5-9	13.8	12.3 - 15.3	598,597-748,246
Moderate Depression	10-14	4.1	3.21 - 5.0	149,649-249,415
Moderately Severe Depression	15-19	2.6	1.9 - 3.26	99,766-149,649
Severe Depression	≥ 20	1.2	0.54 – 1.84	2,494-99,766

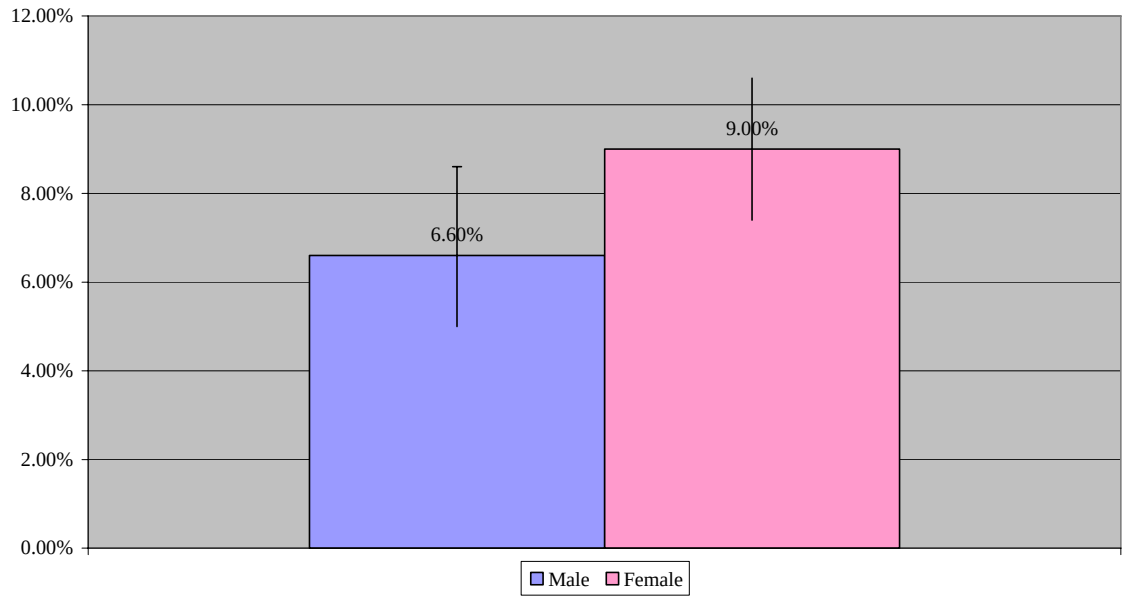
[iii] The 2006 MA population estimates for intercensal years are obtained from the Massachusetts Institute for Social and Economic Research (MISER). The 2006 MA BRFSS percent population confidence intervals were applied to the MISER-MA 2006 population estimates (NOT shown in Table 1) to obtain the 2006 BRFSS MA population estimate range.

Demographics

Gender

Men and women did not differ on prevalence rates of current depression (*Chart 2, Algorithm 3)*. However, women were more likely then men to report ever having been told by a doctor or a healthcare professional that they have depression.

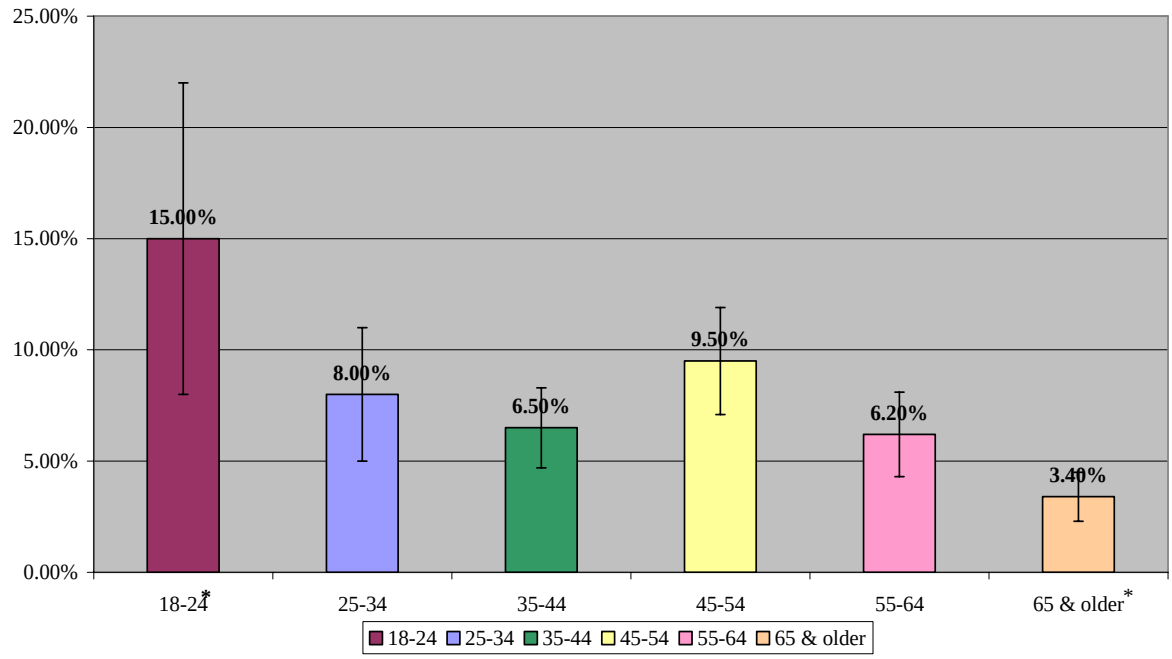
Chart 2.
Algorithm 3.
Current Depression by Gender



Age

Respondents between the ages of 18 to 24 had the highest prevalence rates for current depression and were significantly more likely than those aged 65 and older to report current depression as indicated by the conservative confidence interval test. The age group of 45-55 year olds had the second highest prevalence rate of current depression (*Chart 3, Algorithm 3.*).Eighteen to twenty-four year olds were most likely to report ever being told by a doctor or a health care professional that they have depression and/or anxiety. Those aged 65 and older were the least likely out of all age groups to report ever being told by a doctor or a healthcare professional that they have depression and/or anxiety.

Chart 3.
Algorithm 3.
Current Depression by Age Groups

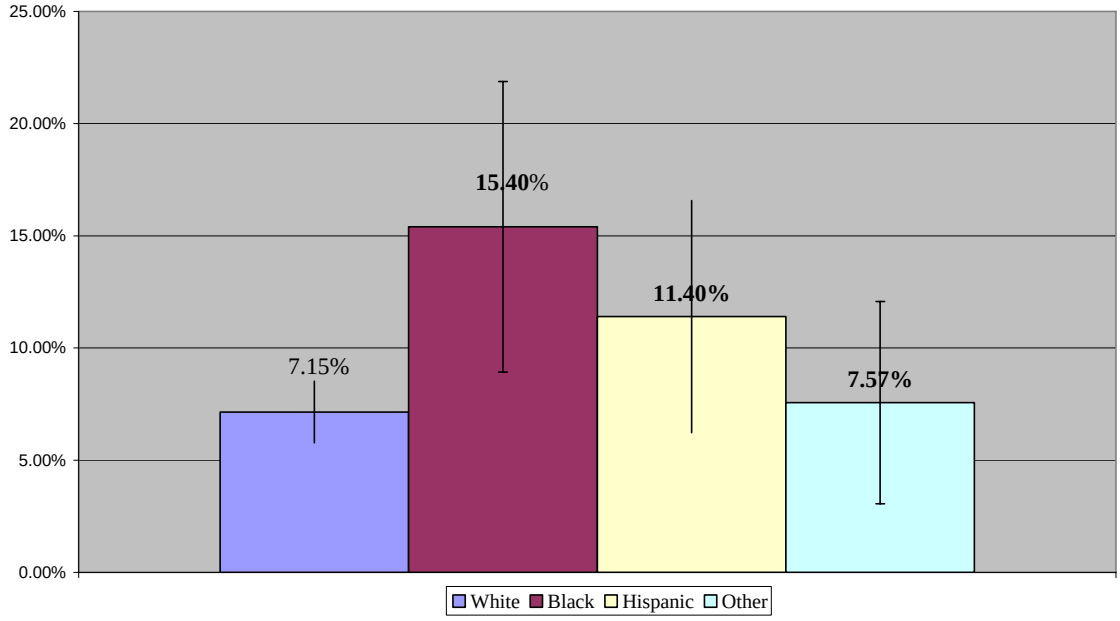


*Indicates significance at the 0.05-level (p < .05)

Race-Ethnicity

Blacks/African American residents had higher prevalence rates for current depression than Non-Hispanic White residents and Hispanic White residents. (*Chart 4, Algorithm 3)*. Black residents had a significantly higher rate of current depression than White residents, while the rates for Hispanic White residents and residents of other races were not significantly different. White residents had higher prevalence rates than residents of all other races-ethnicities of ever being told by a doctor or a healthcare professional that they have either anxiety or depression; these differences in rates were not statistically significant.

Chart 4.
Algorithm 3.
Current Depression by Race



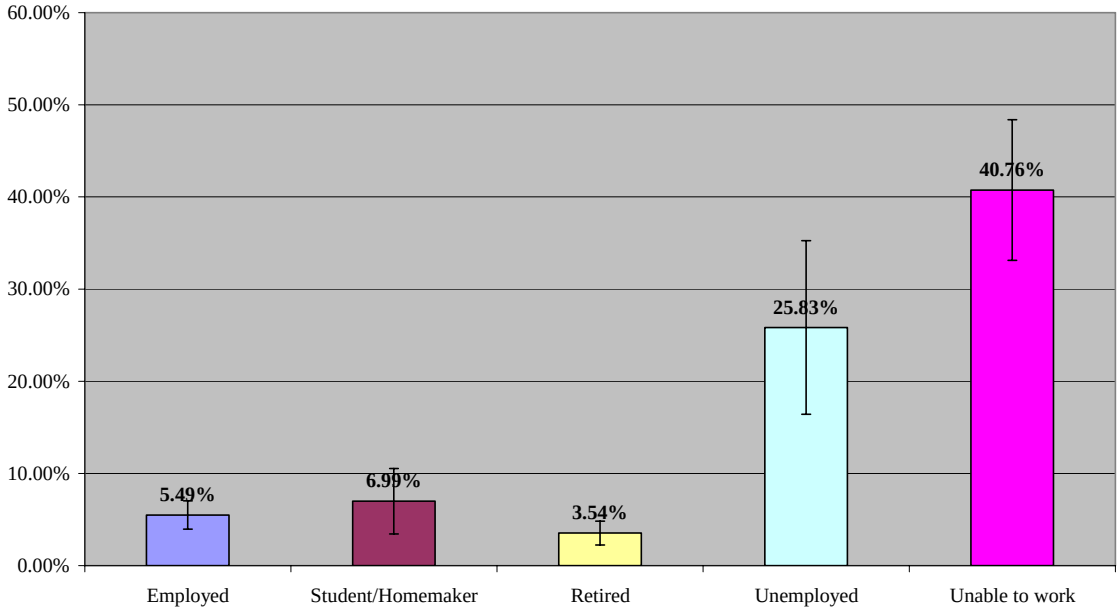
Veteran Status

According to the 2006 MA BRFSS, 11% of Massachusetts residents were military veterans, 93% of whom were male and the remaining 7% female. Forty-three percent of veterans were between the ages of 18 to 59 and 56% were 60 years old or older. There were no differences in rates of reporting current depression between military veterans and other adult residents of Massachusetts (*Algorithm 3*).

Employment Status

Those respondents who reported being unable to work or who were unemployed had the overall highest prevalence of current depression and the differences between the employed and non-employed were statistically significant as indicated by the conservative confidence interval test (*Chart 5, Algorithm 3).*

Chart 5.
Algorithm 3.
Current Depression by Employment Status*



* Indicates signifigance at the 0.05-level (p<.05)

Health & Wellness

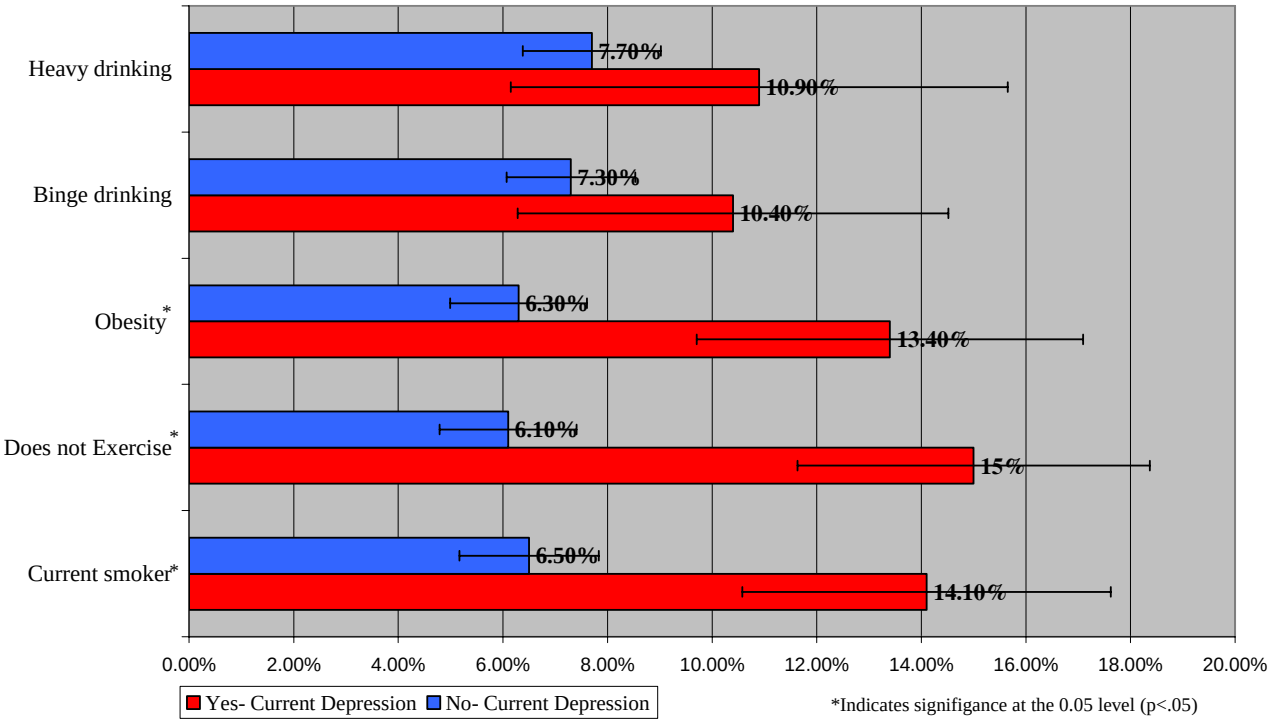
Respondents who were obese had a significantly higher rate of current depression than those who were not as indicated by the conservative confidence interval test. Those who did not exercise on a regular basis were significantly more likely to report depression than those who exercised regularly.

Current smokers were significantly more likely to be depressed than non-smokers while there were no significant differences between those cases who reported a smoking quit attempt during the previous year and those who did not. Due to survey design, there were no cases reported as "Heavy" smokers in this sample.[iv]

Respondents who were binge or heavy drinkers had higher rates of current depression than those who were not, but the rates were not statistically significantly different from one another. (*Chart 6, Algorithm 3).*

[iv] The MA BRFSS administers state-added and CDC optional module in sample splits and the PHQ-8 and Tobacco module (where the questions allowing for a definition of heavy-smoking are located) were not in the same sample split in 2006.

Chart 6.
Algorithm 3.
Current Depression by Selected Health Behaviors



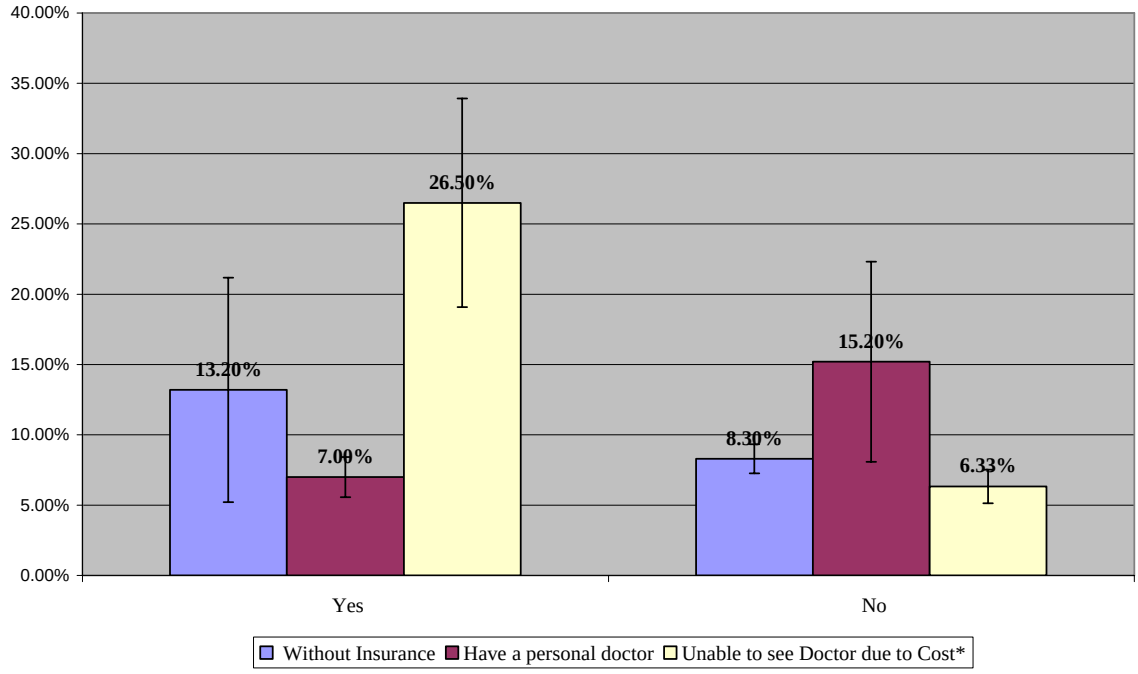
Health Issues

There were no differences in rates of current depression for those respondents who reported having either a history of stroke or cardiovascular disease. However, those with diabetes had higher rates of current depression than those who do not (*Chart 7, Algorithm 3).*

Health Care Access

Persons without insurance had higher prevalence rates of current depression than those with some form of insurance. Respondents who have public insurance were more likely to report depression than those who have a form of private insurance. People who reported having a personal doctor were less likely to report depression than those without. Those who reported that they needed to see a doctor during the past year, but were unable to due to cost were more likely to report current depression (*Chart 8, Algorithm 3)*.

Chart 8.
Algorithm 3.
Prevalence of Current Depression by Health Care Access Issues



*Statistical signigance indicated at the 0.05 level (p<.05)

Suicide

Based on 2006 MA BRFSS results, an estimated 3.7% of the Massachusetts population have considered suicide, out of which approximately 34% has attempted suicide. An estimated 36% of individuals who attempted suicide sustained injuries that

required medical attention. Fifteen percent of Commonwealth residents have lost someone to suicide at some point during their lives (suicide survivor) out of which an estimated 22% sought support to cope with their loss. For those who did not seek support, the main reasons cited were lack of information regarding suicide survivor support resources (11%) and their own depression at the time (11%).

More than half (54%) of those who have considered suicide reported current depression symptoms of any severity level. Respondents who had considered suicide during the past year were more likely to report current depression symptoms (any severity level) than those who did not.

Summary and Conclusions

Depression Prevalence

Depression is both common and treatable. Over "80% of people with depressive disorders improve when they receive appropriate treatment." [19] Unfortunately, nearly 50% of depressed people do not seek treatment. Untreated major depressive illness costs the country $44 billion a year in reduced productivity[20]. In addition, untreated depression is the single most consistently identified illness among people who later commit suicide.[21]

Gender

The 2006 MA BRFSS Depression results showed no gender differences in the prevalence of current depression. In contrast, National epidemiological studies have repeatedly demonstrated that women are twice as likely to be depressed regardless of race, ethnicity, and social economic background.[22] [23] [24] However, men have much higher suicide rates. The Injury Surveillance Program of the MA-DPH in 2006 reported that men complete suicide at a rate about 3 times more than women.[25] Nationally, men complete suicide at a rate four times more often than women, despite women having more attempts.[26] [27] Therefore despite the high rate of suicide, men are less likely to report or complain of depressive symptoms.

Some researchers hypothesize that men express depression differently and have different coping skills than women .These studies have theorized that these differences

are due to neurobiological and psychosocial factors.[28] Hence, self-report for depression screening may not be a reliable methodology for males.

Age

Massachusetts 2006 BRFSS respondents aged 18-25 have the highest prevalence rates of current depression (15%). National data demonstrates that among 18- to 25-year-olds, the prevalence of Serious Psychological Distress is high (18.6% for 18-25 vs. 11.3% for all adults 18+). In addition, this age group shows the lowest rate of help-seeking behaviors.[29] Only 25% of these young adults believe that a person with mental illness can eventually recover.[30] This is alarming considering that suicide is the third leading cause of death for this group. The Substance Abuse and Mental Health Services Administration (SAMHSA), an agency within the U.S. Department of Health and Human Services, has launched a mental health and recovery campaign geared towards this age group. This initiative seeks to educate 18-25 year olds on mental health issues and how to seek services for themselves or to support those with a mental illness.[31] [v]

Massachusetts adults aged forty-five to fifty-five have the second highest prevalence rate of current depression. Data from DPH indicate that 42% of all suicides completed in 2005 were among persons aged 35-54 years old with middle-aged males having the highest numbers. The highest rate of suicide among females was in the 45-54 year age groups (6.5 per 100,000). Education and screening activities implemented at places of employment may capture a good percentage of this age group; however it will not be inclusive: homemakers will not be represented. Innovative activities need to be developed in order to reach this largely female population. Possibilities include an outreach program to the Parent-Teacher association, the YMCA, or continuing education programs.

Adults 65 and older have the lowest rate of reporting depression. They are also the least likely out of all age groups to report being told by a doctor or a healthcare professional that they have depression and/or anxiety. The National Institute of Mental Health (NIMH) reports that depression is widely undetected and under treated by geriatric physicians[32]. Although depression is not a normal part of aging, many health

[v] For more information on the "What a Difference a Friend Makes" Campaign, go to http://whatadifference.org/index.html

care professionals and elders themselves believe that it is. This attitude is often cited as the reason for the under-diagnosis and under-treatment of depression in elders. Elders' risk for depression increases with comorbid medical illness and a decline in function. In 2004, those aged 65 and older accounted for 16% of all completed suicides in the United States[33]. Massachusetts data from 2005 indicate that males 85 and older had the highest suicide rate (25.1.6 per 100,000)[34]. Educational outreach and access to geriatric mental health consultation needs to be made available for primary care physicians, nursing homes, elder independent living communities, first responders, and to elder adults themselves.

Cultural Issues

The Massachusetts 2006 BRFSS data show that Black/African-American residents have higher prevalence rates of current depression than all other race-ethnicities; however White, non-Hispanic residents were the most likely out of all racial-ethnic groups to have been told be a doctor or a healthcare professional that they have either anxiety or depression. Important information not provided by these data include estimates of the number of people who ever received treatment for depression or anxiety, the type of treatment received (e.g. medication, counseling, hospitalization), and its duration. Current studies of racial-ethnic disparities in the diagnosis and treatment of depression and anxiety are inconclusive with regard to rates of detection and treatment; illustrating the need for further research in this area.[35] [36]

Veterans

Massachusetts veterans surveyed by the 2006 MA BRFSS did not differ from the general population in depression prevalence rates. However, this is an area that should continue to be monitored. National data on veterans show that they are at higher risk than the general population for depression, substance abuse, and suicide. As of 2005, an estimated 24.5 million U.S. residents are veterans. Approximately 7% are women, 39% are aged 65 and older, and 9% are African-American. The Department of Veterans Affairs (VA) estimates that 462,000 of these veterans reside in Massachusetts. [37]With these numbers expected to increase, Massachusetts needs to plan for the growing need of mental health services to this population.

Disability and Employment

People who are unable to work have the highest depression prevalence, followed by those who were unemployed, whether for more than or less than one year. Research has shown that job loss and financial strain is a strong predictor of psychological distress [38] [39] so much so, that it is listed among risk factors for suicide. One study reported the prevalence of depression, anxiety, and somatic illness was from four to 10 times higher for those unemployed than employed people. It also reported that the presence of a psychiatric diagnosis resulted in a 70% decrease in the odds of obtaining new employment.[40] Unemployment agencies may consider utilizing a depression screening checklist upon intake and follow-up. The reduction of depressive symptoms may facilitate a secure job placement and increase the client's chances of job retention.

Undiagnosed and untreated depression in the workforce can negatively impact performance and may result in higher absenteeism. Workplace depression screening has been shown to improve employee health resulting in higher productivity and lower employer costs.[41] [42]

Health Issues

The influence of mental health upon physical health is so crucial that it has been identified as a health indicator by Healthy People 2010. Untreated depression impacts physical health related to chronic conditions, increases unhealthy habits, and decreases use of preventive health services. Results from the 2006 MA BRFSS support this observation. Respondents who identified themselves as a current smoker, being obese, and not exercising were at higher risk for reporting current depression. The Massachusetts Department of Public Health has utilized MA BRFSS data to inform program planning. The Massachusetts Tobacco Control Program is one example of an MDPH program which has done this extensively. Future public health endeavors should examine the relationship of depression to the target health issue to inform program development or enhancement. Health and wellness programs (e.g. smoking cessation) support individuals as they make lifestyle changes. A person needs to be motivated to change; depression negatively affects motivation. A health intervention program that incorporates a plan for how to address potential depression may experience a higher success rate.

Health Care Access

Access to health care appears to have an effect on the prevalence of depression based on the 2006 MA BRFSS data. Having a personal doctor appears to reduce the risk of depression, while those who have public insurance and/or unable to see a doctor when needed increases the prevalence of depression. The annual implementation of the MA BRFSS will enable MA-DPH and MA-DMH to track the effect of the Massachusetts' Health Care For All on access to care for depression and psychological distress.

This 2006 PHQ-8 MA BRFSS report was made possible due to the collaboration between the Massachusetts Departments of Mental and Public Health.

Appendix A.

Participant Demographics

Unweighted Frequencies

(N=5, 992)

	N	*%*
Gender		
Male	2,308	37.0
Female	3,942	63.0
Age		
18-24	265	4.2
25-34	728	12.0
35-44	1,234	20.0
45-54	1,294	21.0
55-64	1,086	17.4
65 & older	1,534	25.0
Race		
White-Non Hispanic	5,256	84.0
Black/African American	320	5.0
White, Hispanic	615	9.8

Asian	105	2.0
Native Hawaiian/Pacific Islander	16	0.3
Native American/Alaskan Native	43	0.7
Other	403	6.5
Multiracial	38	0.6
Marital Status		
Currently Married	3,037	49.0
Previously Married [vi]	1,863	30.0
Never Married[vii]	1,316	21.0
Education		
Less than HS	681	11.0
HS or GED	1,754	28.1
Some college or higher	3,796	61.0
Employment Status		
Employed/Self Employed	3,516	56.3
Student	128	2.1
Homemaker	393	6.3
Retired	1,380	22.1
Out of work for LE 1 year	166	2.7
Out of work for GE 1 year	144	2.3
Unable to work	503	8.1
	N	**%**
Veteran Status		
Yes	713	11.0
No	5,479	88.0
Household Income		
LE $10,000	339	5.0
$10,000 to LE $15,000	363	6.0
$15,000 to LE $20,000	406	6.5
$20,000 to LE $25,000	400	6.4

[vi] Previously married includes those divorced, widowed or separated
[vii] Never married includes those never married or member of unmarried couple.

$25,000 to LE $35,000	513	8.2
$35,000 to LE $50,000	715	11.4
$50,000 to LE $75,000	817	13.1
$75,000 or GE	1,556	25.0
DMH Catchment Area		
Metro Boston	621	10.0
Central Mass	907	15.0
Metro-Suburban	761	12.0
North East Area	1,530	24.0
South East Area	1,553	25.0
Western Mass	877	14.0

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